Introduction. Beyond almost two decades of decline, due to sharp reduction of the volume of field surveys and to development of mobile methods of near-surface geophysics, gravity exploration experiences the certain getting up again. The rise is caused by the reorientation of a geological survey orders from government services to the private sectors of geophysics, because of new public relations assigned. Private companies produce enhanced requirements to methodology optimal by the expenses (for *minimum* of time it is required to execute a *maximum* of surveys of *acceptable quality*) and to the accuracy (resolution) of *measuring*. A modern foreign apparatus and methodologies of measuring, tested by time, are adequate to the modern requirements to the data acquisition.

The same requirements by the optimality and exactness, however, they produce also to facilities of *interpretation* of the potential field data in the modern geophysical practice. Particularly, there are such conditions:

1. A high *accuracy*, technologibility (expansibility, compatibility of formats) and mobility (operation in different configurations of "hard" and software) of the algorithms and programs;
2. An adaptation of the mathematical models of the field to realities of measuring: the acquirement of the initial measuring on the short profiles or in the irregular framework of supervisions;
3. An adaptation of the mathematical models of geological media to the realities of its structure, i.e. to the complicated (nonlinear and heterogeneous) state of structures, to the dispersion of its physical properties.

There are enormous volumes of gravity measurings of acceptable quality in the archives, acquired within the second half of XX century. Because of these, much attention is spared to the questions of its *reinterpretation* upon the new basis. However, because of advanced requirements to exactness and efficiency of the interpretation, the reprocessing of large bulk of gravity data requires follow actions to be performed:

1. the incorporation of a new *numeral methods* and models [1-4] for interpretation of gravimetry data;
2. the introduction of a new base of gravimetry and the *change* of the existent *standards* of gravity measurements preprocessing [6-7];
3. the use of a new techniques of preparation of the digital maps and databases [8-9];
4. the implementation of a new presentations of initial data [10].

All of the indicated directions of enhancement of methods of processing of the potential fields data are on the different degree of advance. All of them develop with a breech-sight on the creation of digital analytical models of the gravity field and geological media, being oriented to the application within the GIS packages (a visual model of interactive interpretation). To provide a unique digital basis for the geophysical databases, one need to convert the paper maps being kept in archives in the different reductions into a digital form, while taking into account the four conditions indicated higher. Because of the finding stated above, there the problems of how to create of speedy and inexpensive solutions for digitizing of cartographic heritage of previous epoch of the geophysics advance and how to create the digital databases on modern programming platforms are still actual.

A generalization and preprocessing of the primary data. We offer the series of the generalizations, validating a requirement in the development of new methodology for the creation of multicomponent databases of geologic and geophysical information (mostly the potential field data) for the territory of Ukraine. Further, there one keep in mind the gravity data, as most close to the author of report.

1. As a kernel of database, it is fully possible to use the PostgreSQL, according to an analysis [11].

2. As a procedure of digitizing of paper maps, we advise to use a technology [8], which uses as initial information prior to the beginning of digitizing not the ordinary maps of isolines, but a new type of digital information in kind of an electronic log of measuring. Here one transform not the paper map of isolines into the same digital map of isolines, with all its errors and problems, but the map of data records (fig. 1) – into the digital grid-map of anomalies, ready to processing within the environment of the specialized scientific packages. Amendment is introduced only on the fact, that since a publication [8], because of progress of GIS techniques, it is recommended to replace used there

proprietary programs by the open-source ones [5, 9]. In addition, the same tendency to the open-source foundation of the processing facilities it is necessary to pawn into a strategy of further development of database projects.

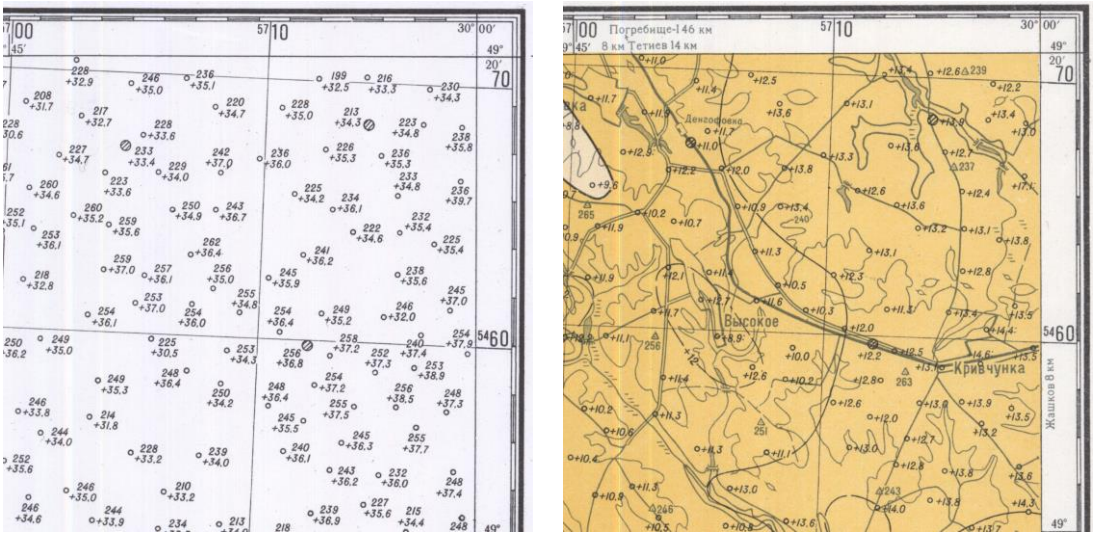

Fig. 1. *Fragment of gravimetric map of USSR, sheet M-35-XXX of scale of 1:200 000: on the left are heights of measured points, on the right are a Bouguer gravity anomalies (σ = 2.3 g/cm^3).*

3. As new standards of reducing and primary processing of gravity data because of growing exactness and details of the investigations taking into account corrections for curvature of layer, hypsography and indirect effects, it is necessary to accept the point of view of Bychkov S. [6]. So, one need to remove thinking stereotypes in the calculations of anomalies of gravity at the creation of appropriate digital databases. It is thus necessary at once to develop for the basic structural areas of the territory of Ukraine the own parameters of calculation of gravity corrections by the new standards, taking into account existent findings (fig. 2), and to change properly Instruction on gravity exploration of 1980.

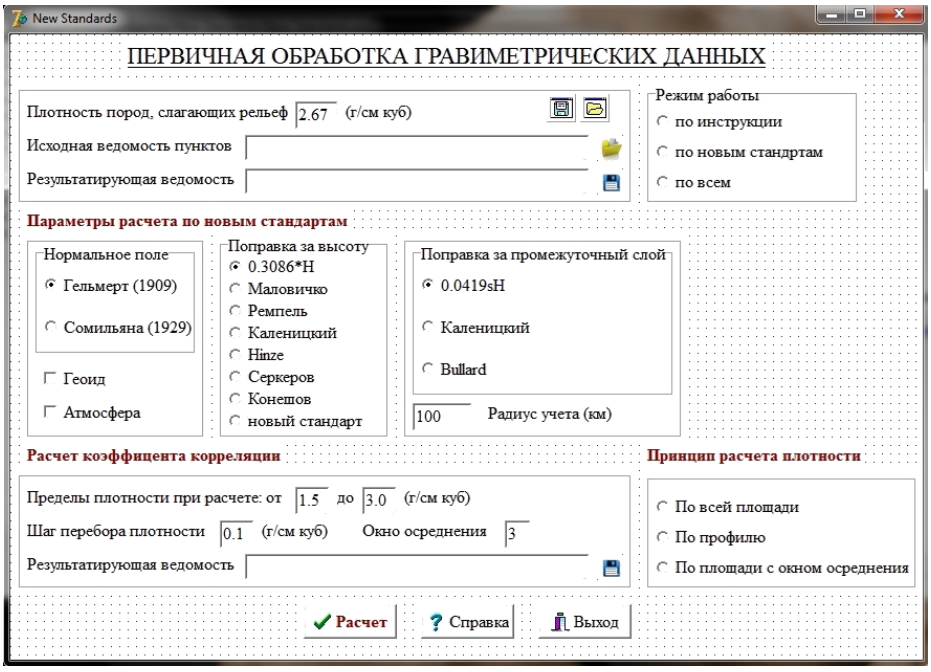

Fig. 2. *Interface of the program New Standards for preprocessing of the gravity measurings (Bychkov S.G., Simanov A.A. and others).*

4. Next generalization, also requiring the change of positions of Instruction on gravity exploration of

1980, is contained in a report [10]. Here is proved the use of map of absolute values of the gravity field g_{obs} of scale of 1:1000 000, created for the territory of Ukraine by efforts of a number of Ukrainian institutes. The creation itself of this map on the base of reliable elevation digital basis of daily surface (created in the Institute for the geodesy and cartography as tables of heights values in the Baltic frame of reference) brightly testifies in behalf of creation of unique data center in internet. Having similar basis, the map of absolute values of g_{obs} and a number of it transforms (fig. 3) is created by a count on the Helmert formula within a regular matrix. It is recovered by the data of summary map of Bouguer anomalies (σ = 2.3. g/cm^3) of scale of 1:200 000. The last one is presented from the complete set of maps of the Geophysical basis for the Tectonic map of Ukraine of scale of 1:1000 000. Now, to get the specified map, or maps of the field transforms, it is enough to change the formula of count or parameters of ellipsoid (datum) within the interface of database.

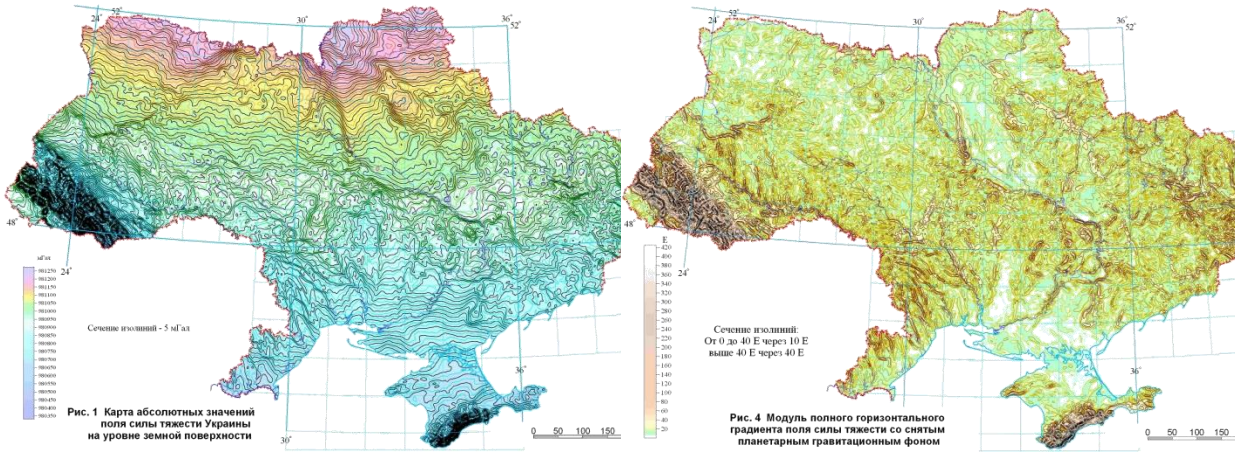

Fig. 3. *Maps of absolute values of gravity (on the left) and its module of complete horizontal gradient (on the right) with the planetary background subtracted [10].*

5. Next generalization touches the concept of universality of databases: data of measuring have the greatest efficiency in combination with data of other methods and processing facilities. It is therefore expedient to accumulate in a integrated interface not only the data of measuring but also sets of maps, catalogues of parameters of rocks and tests, chart of experiments, description of methods and matrices (working formats) of processing results. Key moment – they all must be accessible for every certificated specialist of industry, regardless of place of implementation of query. It means that to handle the similar bases of knowledge is reasonable act as thematic portals with the set of maps, algorithms and programs. Examples of such openness of data are both in near (ex-USSR) and in the distant (Western) foreignness. However, in Ukraine there are only a few narrow industry databases given, inaccessible for a wide consumer.

6. An informative crisis attained the Earth sciences, and this requires the systematization and generalization of knowledge. Changing of paradigms within the limits of one-generation make actual a requirement in the remote co-operation between the researchers and industry – for the aims of trade-out of ideas, facilities, skills (symbol mathematics, digital cartography, GIS, numeral optimization, visualization and so on). Such co-operation can be arranged with the help of the creation of *interactive* bases of knowledge based on *open* thematic internet portals, which unite theoretical methods, numeral algorithms, a programs and databases for basic geophysical divisions – from a gravimetry to nuclear geophysics. Creating such bases of knowledge is possible exceptionally based on the common interdisciplinary government program.

The digital databases (maps) of the potential geophysical fields must become the basic filling of such portals. On their basis united by the remote digital technologies the virtual collectives of scientists from different organizations can create the digital models of geological media, both for especially scientific and industrial necessities.

7. An important consequence, following from this generalization, consists of that fact that it is need

not simply to abolish the vulture of secrecy, sufficing above gravimetric materials (now it is replaced by a vulture 'Official use only', but to get a concrete gravity source selection did not become easier). It is needed in general to reformulate the concept of intellectual property: to protect by a copyright not the primary data of measuring, but the result of their intellectual treatment. Thus for result it is considered the *scratch data file* of certain program, but not the eventual file of print illustration.

Conclusions and suggestions. A considerable transformation of methodology of processing of high-fidelity gravity data is needed taking into account modern requirements to the accuracy of interpretation and a modern data about a geoid heights and Earth relief.

1. In particular, for the reliable prognosis of the dangerous geological and technogenic phenomena, except a theory and programs, the array of data of high accuracy is needed, received from monitoring of geophysical fields on the permanent geophysical grounds. There a separate monitoring links (seismic, magnetic) exist, but they are still without the integrated national center of data. In a gravimetry, similar databases have separate regional character and they are inaccessible for researchers. Because of absence of reconnaissance surveys to begin the creation of digital databases, it is worth by the digitizing and reinterpretation of the archived materials.

2. For this purpose, it is necessary to change cardinally the terms of access to the materials of surveys, and to inculcate within the standard of data origination a new methodology of digitizing of geophysical data. One must do it based on grid-maps of measuring points (data records, but not the isolines). Moreover, one must introduce new methods of reducing of anomalies, and new components of the gravity field into survey planning and preprocessing.

3. A key trends of the geophysics progress are social ones (commercialization, co-operation), technological ones (site building, multi-technique calculations), methodological ones (geo-referencing, guided interpolation, typification of models). They require the creation of the open access knowledge banks and databases. The scientific results received (analytical methods, digital models and databases, illustrations) it is expedient to give in open access – for a scientific association and (self-)teaching of analysts and students.

4. An existent competition in the access to the *primary data* of the geophysical measuring is deeply vicious; it is expedient only in the distribution of *results* of data interpretation. It is needed to revise maintenance of the intellectual property: to declare it not to the *primary data* of surveys (logs of running, matrices of data), but on the results of their *processing* (maps of the field reductions etc.).

5. Change of the methodology of modeling of complicated geophysical processes [12] based on digital databases requires a gradual transformation of the geophysical education in Ukraine, in particular, the development of new courses, teaching forms.

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